University of Innsbruck / Timber Engineering Unit

holzbaulehrstuhl
Universität Innsbruck

Quality Control in Wood Construction

Asst.-Prof. DI Dr. techn. Anton Kraler

Workshop 2 – 2011 Wood Structures Symposium

What is quality?

Quality is defined as:

"Degree to which a set of inherent characteristics fulfills requirements"

-ISO 9001:2008-

Quality management

... the whole of features and characteristics of a product regarding its ability to meet the quality requirements.

EN ISO 9000

Rules for the organization, implementation and monitoring of measures

Regulations and quality marks

Why quality control?

Why quality control?

Quality requirements

What customers want:

- Customer focus and customer service
- Compliance with the contractual agreed quality

What companies want:

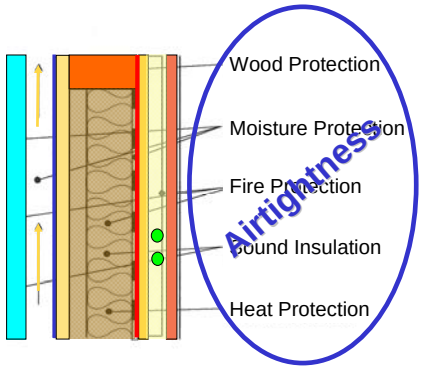
- Profitable construction project
- Compliance with the contractual agreed quality

Quality management - works!

stave church - 900 years

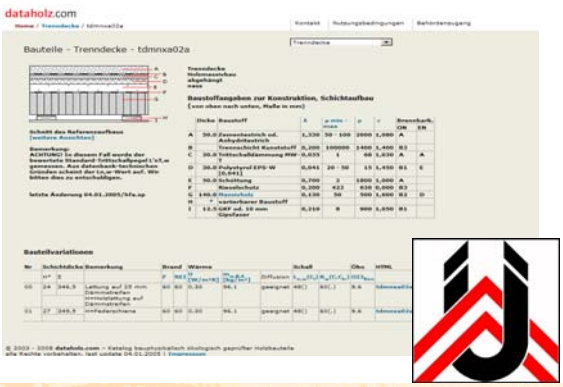
farm - 500 years

Quality requirements - present

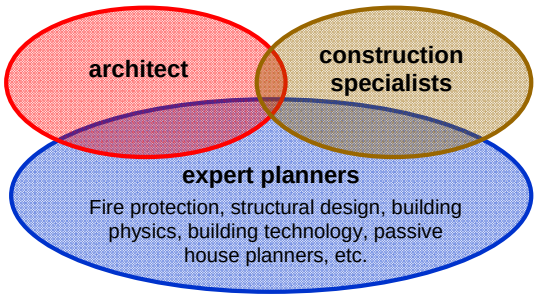


Materials for timber constructions

Support by certified constructions



Quality criteria for the construction process



Requirements for high quality products

- Quality Awareness
  - The company management must want quality
- Quality Production
  - Specialization, prefabrication
- Quality Products
  - Clear definition, e.g. wall elements with quality certification labels
- Quality Control
  - Internal and external controlling (external monitoring)
- Quality Management
  - Procedures: Organization and implementation of measures

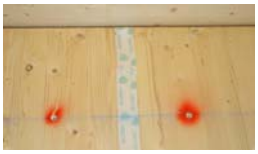
Quality Control

Quality Monitoring during Production and Construction



Quality Control

Quality Monitoring during production and construction

Quality Control

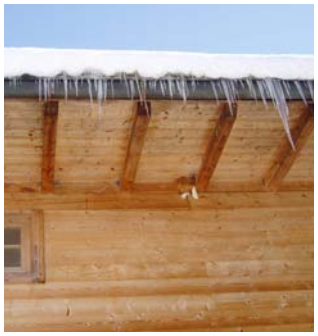
Quality Monitoring during Production and Construction





Quality Control

Damage caused by leakages

Quality Control

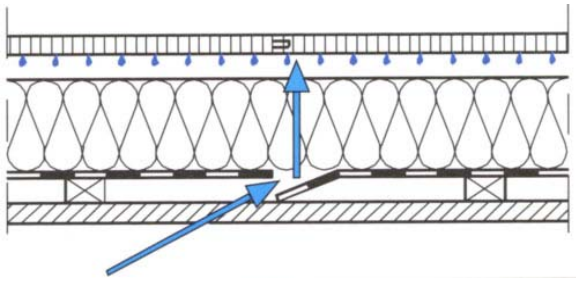
Damage caused by leakages


Quality Control

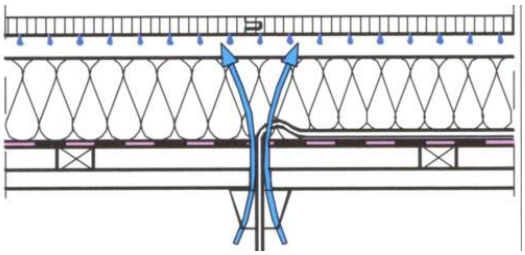
Damage caused by leakages




Planning and execution fault



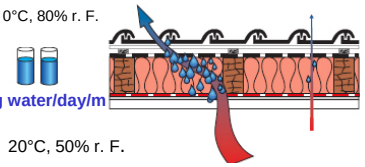
Planning and execution fault



Why quality control? Why airtightness?

Problem: A gap with airflow from humid side

outside: 0°C, 80% r. F.



360g water/day/m

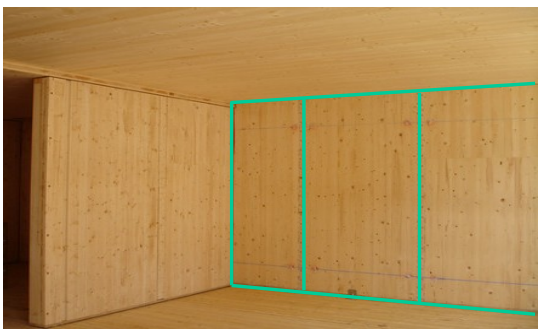
inside: 20°C, 50% r. F.

For comparison: with vapor diffusion, only 1g water/day/m²

1 mm gap in construction

Quality assurance by quality monitoring

Quality assurance by quality monitoring



Quality control – airtightness

Measuring System

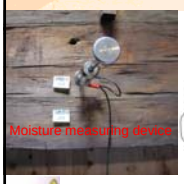
- Door frame with a membrane
- Measuring Instrument (data capture and evaluation)
- Fan

Aids and Appliances

Fog generator

Flow meter

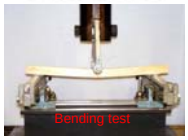
Quality control – timber


Moisture measuring device


Ultrasonic testing equipment

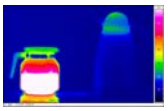

Drill resistance measuring device

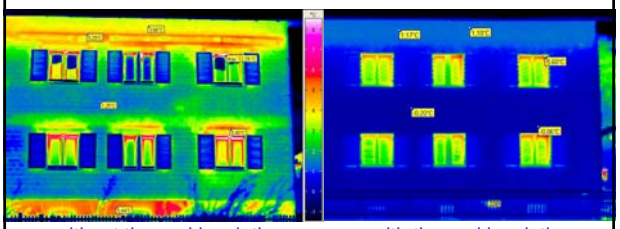

Fractometer tests


Bending test


Hardwood core drill

Quality control – thermal insualtion





without thermal insulation with thermal insulation

Why quality control? Why airtightness?

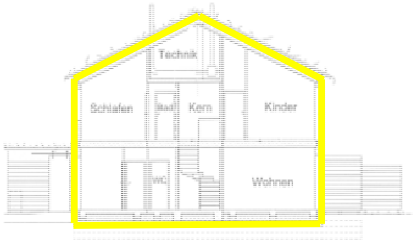
Heat loss through leakage

4.8 times more heat is lost across the gap than over the entire surface of 1m² of insulation.

Example:
U-Value (calculated) = 0.30 W/m²K
U-Value with the gap (0.30 W/m²K x 4.8) = **1,44 W/m²K**

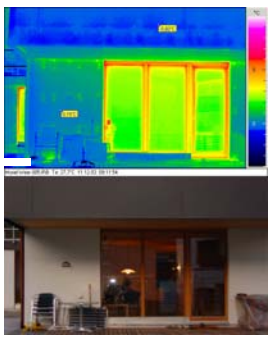
outside: 0°C, 80% r. F.; inside: 20°C, 50% r. F.;

Thermal building envelope



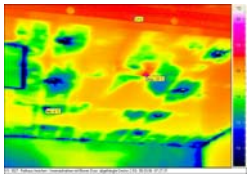
Infrared thermography

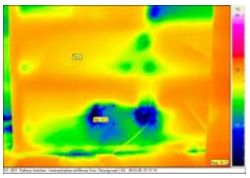
Thermography camera



Quality control: blower door - thermography

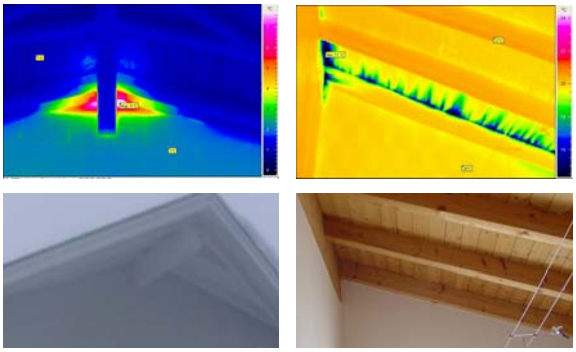
Example: Installation (wiring)





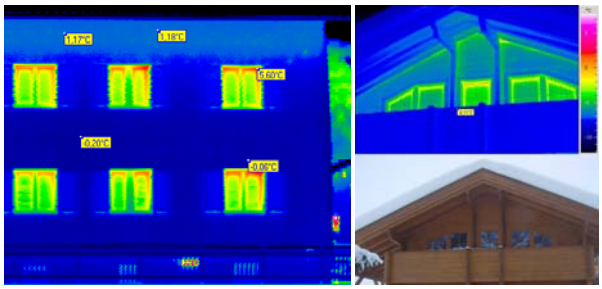
Quality control: blower door - thermography

Example: roof connection

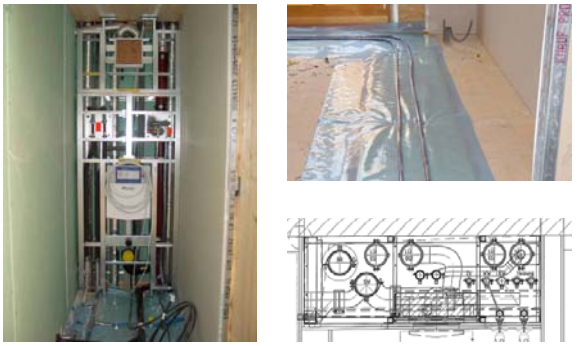


Quality control: blower door - thermography

Example: faultless execution



Quality control: heating, water, ventilation



University of Innsbruck / Timber Engineering Unit

holzbaulehrstuhl
Universität Innsbruck